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White pine needle diseases

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Recommended Citation

Forest Health and Monitoring Division; Maine Forest Service; and Department of Agriculture, Conservation and Forestry, "White pine needle diseases" (2020). *Forest Service Documents*. 98.

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White Pine Needle Diseases

Hosts: Eastern white pine (*Pinus strobus*)

General Information: The most commonly reported eastern white pine needle diseases (WPNDs) that cause premature needle loss in eastern white pine (EWP) in the northeast are brown spot needle blight (*Mycosphaerella dearnessii* / *Lecanosticta acicola*), *Bifusella linearis* and Dooks needle blight (*Lophophacidium dooksii*). *Septorioides strobi* has also been found in Maine and has been associated with EWP damage in the Northeast. The prevalence and distribution of these diseases vary across the region. WPNDs are favored by prolonged periods of wet weather in spring, as the diseases are spread by rain splash during needle elongation. For the WPNDs mentioned here, initial infection of current-year needles happens in spring/early summer and it is not until the following year that these needles become symptomatic. Fungal spore-producing structures then erupt from them (Figure 1, right inset) releasing spores and the current year's new growth will be infected, completing the disease life cycle (Figure 3, right). While the infected current-year needles will show no symptoms in the first year, the infected and discolored second-year needles drop off the tree around mid-summer. Heavy disease pressure can result in branch dieback in the lower portions of trees and subsequently smaller living crowns (Figure 1, left). White pine regeneration in the understory of infested pines is often severely affected (Figure 2, left). Crowded plantings and other site conditions favoring high relative humidity can make WPND symptoms worse. This type of chronic stress may make trees susceptible to secondary insect and disease agents of decline, compounding tree health concerns and possibly resulting in mortality.

Symptoms and Signs: Symptoms indicating early stages of fungal infection include yellow spots or bands on needles. These dark bands and spots are often surrounded by a yellow halo at first and dried resin droplets are sometimes seen in the affected area. The whole needle eventually turns reddish brown as the infection spreads and the needle is girdled. A scorch-like symptom results as needle tissue beyond the band turns brown. Heavily infected trees will appear pale and have a yellow-orange or brownish hue (Figure 2, middle). These symptomatic needles are shed, although some remain caught in the crown and can cause further infection during extended periods of moisture. (Continued on back)



Figure 1: (left) Thin and small crowns of white pine trees severely infected with white pine needle disease. (right) Close-up of symptomatic needles and (inset) a spore-producing structure of the brown spot needle blight fungus Photos: Maine Forest Service; Isabel Munck, USFS.



Figure 2: (left) Heavy brown spot needle blight fungal infection of white pine regeneration in the understory of an infected white pine stand. (middle) Browning of needles in mid-summer due to WPND infection, prior to premature needle drop. (right) Severely defoliated white pine trees after needle drop. Images: Isabel Munck, USFS.

Management: Low-density stand management is currently proposed as the best prescription against WPNDs in EWP stands in the Northeast. This approach reduces competition, favors crown development and promotes canopy drying, thus creating conditions that are favorable for growth and not favorable for WPND development. Management of stands having less than an average of 30 percent live crown ratio should be undertaken with caution. While the stand could benefit from being opened up, the post-management stress and logging damage to these stands may lead to severe health effects and mortality of remaining trees. Stand entries should be limited to the winter months when the ground is frozen to minimize disturbance and tree stress. When thinning, select trees that are suppressed or defective, have resin streaking on the bole (indicative of *Caliciopsis* canker), those previously affected by white pine weevil, etc. This will ensure a better overall response to management in the form of increased live crown ratios and growth. For landscape trees, protective (preventative) fungicides could be applied in spring as new needle growth emerges before spore dispersal. Repeated applications should follow at proper intervals (depending on the residual period of the fungicide applied) to protect the needles for four to six weeks after bud break.

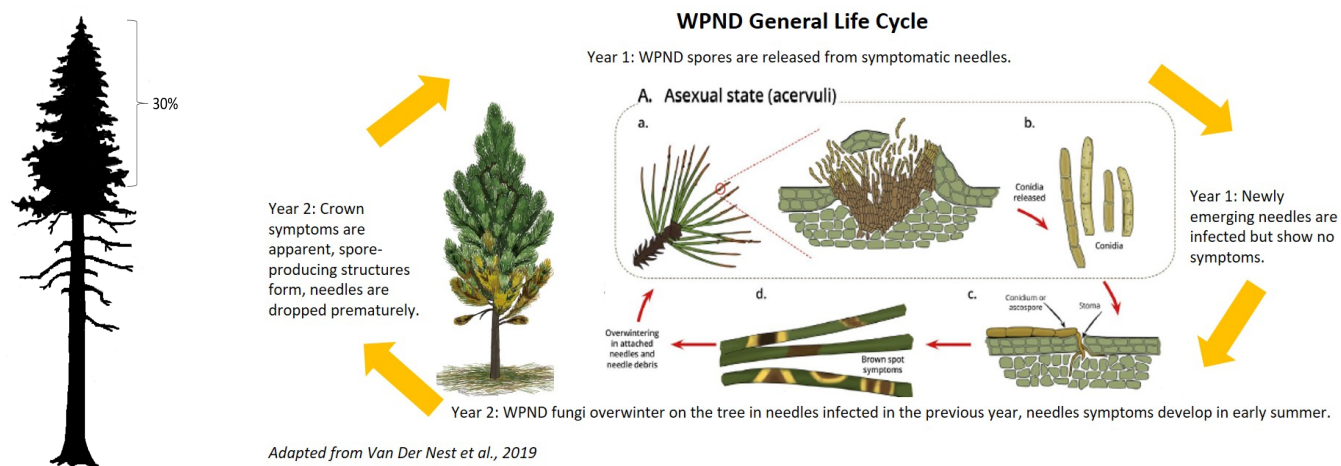


Figure 3: (left) Example of a 30 percent live crown ratio; (right) General WPND life cycle. Adapted from Van Der Nest et al., 2019.